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NEWCASTLE IMPROVEMENTS.—No. II.

[Royal Arcade.]

RICHARD Grainger was born in 1798, in High Friar Chase, Newcastle-upon-Tyne. His father was a porter employed on the quay. His mother, a native of Gibraltar, earned a subsistence for her children, after her husband's death, by stocking-grafting, glove-making, and clear-starching. At the time of the birth of Richard, the third son, the family lived in two small rooms: the only prospect of education for the children was from the charity-schools of the town. Richard had no other schooling than what he got at the parish charity-school of St. Andrews, whose course of study was comprised in the Bible, Tinwell's 'Arithmetic,' 'Tom Thumb,' and a spelling-book. Some of the inhabitants of Newcastle can recal the appearance of the boy in those days in his green badge-coat, with his round, ruddy, smiling face, and his quiet manner. He was then remarkable for nothing but his serenity, his characteristic through life. He now looks back with great affection to his school-days, and likes to speak of his humble home, and the companions with whom, from his easy temper, he was always on good terms.

When he was twelve years old a change of importance took place in the town. The shambles had been till then in the open street. At that time a commodious covered market was erected in the Dean, in a low but central situation, at a cost to the corporation of 17,000*l*. This improvement seems to have struck his mind.

He was also early impressed with the inconvenience occasioned to the inhabitants of the town by a great space in the centre being wholly useless for purposes of communication, and the principal streets being therefore widely circuitous. North of the High Bridge, where the Dean widened, leaving a space of twelve acres, there had been a convent of Franciscan Friars, and the nunnery mentioned before, with the holy well. This space was, in Grainger's youth, occupied by an old mansion (once the prison-house of Charles I.), surrounded by gardens and plantations, which were rendered unproductive by the smoke of the surrounding town. This extent of twelve acres, serving no purpose of either use or ornament, early interested Grainger's imagination as the scene of vast future improvements; and he hoped the day might come when it would be in the hands of some one who would sell it. That time arrived, as we shall see, when he himself was able to be the purchaser. Meanwhile he saw in vision, as he now declares, the new town as it has arisen under his hands—terraces, squares, long ranges of streets, all fronted with polished stone, instead of the peculiarly ugly brick of which the old town was built. He noted the extent of the quarries in the neighbourhood, and the quality of the stone, and rightly concluded that the prejudices which had hitherto interfered with the use of this abundant natural treasure were unfounded.

All these thoughts occupied his mind during his apprenticeship. His master was a house-carpenter and builder, of the name of Brown, who has since been employed as a journeyman on some of his pupil's erections. Grainger won some attention at this time by the remarkable steadiness and easy composure of his character, giving promise of respectability and indications of power of mind. He belonged to the Methodist body, and was pointed out to Mr. Fenwick, who was afterwards his

attorney, as a fit person to be employed in collecting the monies of the Tract Society. He brought in the subscriptions weekly with entire regularity; and Mrs. Fenwick, seeing him on one of these occasions, asked who he was, saying that she had "never seen such a bonny lad."

When he was out of his time, his elder brother, George, who was a bricklayer, engaged him to join in an enterprise of his own, pulling down and rebuilding a small house next their mother's, in High Friar Chase. This humble abode is now an object of some curiosity as the first work of Richard's hands after beginning business on his own account. This brother George fell ill, and became incapable of business many years ago, and then died, or, it is possible, his name might have risen with his brother's.

Mr. Batson, an opulent member of the religious society to which Richard Grainger belonged, became early interested in him, and afforded him the first opportunity of distinguishing himself. Mr. Batson was employing some of his capital in the erection of Higham Place when Grainger set up for himself, and he employed the young man to build some of the houses. The older builders, who were engaged in other parts of the new erections, laughed to scorn the idea of the proprietor employing "a raw lad like Grainger." Grainger, however, did his work thoroughly well. He gave his whole mind to it, rising at three or four in the morning, and working till nine at night.

Soon after, Grainger married well. At class-meetings he had become acquainted with Rachel Arundale, and they became attached, and married. She has been an excellent wife, aiding him not only by providing him the asylum of a comfortable home, but by the goodness of her taste, and by her talents for business. She has assisted him throughout his years of enterprise by managing his accounts and conducting his correspondence. She had a fortune of 5000*l.*

The first undertaking which Grainger entered into from his own resources was building two houses in Percy Street. Then he erected nearly the whole of the east side of Carliol Street, a part of New Bridge Street, and the whole of Blackett Street, except eight houses. This street, not planned by him, was considered a grand affair at the time of its erection, from its width and regularity, though the houses are of brick, and have no pretensions to architectural beauty.

From these works, Grainger now proceeded to a more ambitious enterprise,—the erection of Eldon Square. Blackett Street runs along one side of this square. The other three sides are composed of handsome stone houses, of a solid, plain, uniform style of architecture, the corner houses next Blackett Street and the Club-house in the centre projecting, and showing somewhat more ornament than the rest. The whole was Grainger's work, with the exception of four houses. The speculation was so successful as to enable him to proceed to yet larger enterprises. Eldon Square was begun in 1826.

Mr. Grainger next opened to Mr. Fenwick, his friend and attorney, a scheme for erecting the Leazes Terrace and Crescent, containing together seventy first-class and sixty second-class houses, with polished stone fronts, more highly ornamental than anything that had yet been seen in the town. His friend, alarmed by the extent of the speculation, advised him to retire upon the 20,000*l.* he had now realised, instead of risking all in so vast an enterprise. Grainger received the remonstrance with his usual placidity, and proceeded to exhibit his calculations. Nothing could be more perfect. There was not a risk left unconsidered. He satisfied his friend of the prudence of the undertaking, built the Terrace and the Crescent, and was enriched by them.

The Leazes are a wide grazing-ground to the north of the town, adjoining the moor. The ground is high, and the situation of the terrace open and airy. It consists of a block of seventy lofty houses, in form an oblong square, and surrounded by a paved terrace walk on the outside of the small gardens in front of the houses. It is deservedly the pride of the town, even now, since the creation of what is commonly called "the new town." So much has to be said of these later improvements, that we abstain from entering into details of the architectural character of any of Grainger's erections prior to 1834. All that he did before that time may be considered as merely introductory to the great work of his life.

One other enterprise only remains to be mentioned as belonging to this early stage of his career,—the Arcade,—perhaps the least successful of his works, though he has lost neither credit nor money by it. The corn-merchants of Newcastle were greatly in want of a Corn-exchange, and there had been much planning and some action about erecting one in front of St. Nicholas church. After dragging on for a long time, the affair came to a stand, and the corn-merchants requested Grainger to provide them a place to meet in. He began to build for the purpose in Pilgrim Street. As soon as this was known, the projectors of the other Corn-exchange bestirred themselves again, and Grainger was obliged to alter the destination of his building. He desired to concentrate as many public offices as possible on this spot, and to make of the remaining part a sort of inn of court, a collection of all the lawyers' offices in the town. In this he has partly succeeded, but only partially, from the Arcade not being a necessary thoroughfare, one end only opening into a busy part of the town. In the Arcade, however, are the Post-Office, the Stamp, Excise, and Permit Offices, the Savings' Bank, the North of England Joint-Stock Bank, and many lawyers, engineers, and architects' offices, some auction-rooms, and shops.

The handsome stone front, occupied by the two banks, is 94 feet long and 75 feet in height. The interior, lighted by eight conical glass domes, is 250 feet long, 20 feet wide, and 35 feet high. This pile of building was begun in June, 1831, and opened in May, 1832. The entire cost is stated by Mr. Grainger to be 40,000*l.*

Already, before beginning his "new town," Mr. Grainger had enriched his native place with property of the value of nearly 200,000*l.*, viz.:—

Early erections, worth	£45,000
Eldon Square	30,000
Leazes Terrace and neighbourhood .	80,000
Royal Arcade	40,000
	195,000

The town now began sensibly to feel the effects of Grainger's activity in the rise of a large body of prosperous artisans, in the importation of Baltic timber, and the increased demand for dwelling-houses, shops, and warehouses, which kept the other builders of the place busier than they were before their great townsman arose. All that we have related, however, was but the beginning of Grainger's achievements.

[To be continued.]

CHIVA.

The Khanate of Chiva, in its original dimensions, scarcely exceeds seventy miles from east to west, and one hundred and twenty from north to south: it is situated south of Lake Aral, and encompassed by deserts or steppes, one of which, that of Gasnak, separates it from Bokhara on the east and south-east; while on the south-west and west it has Turcomania, or the wild regions inhabited by the Turcomans, for its neighbour. The banks of the Amu-Derja, or Oxus, form the greater part of its north-eastern frontier. But the Khan,

ate in its present extent embraces many surrounding districts, such as portions of Persia, Bokhara, and Turkomania, which fear or conquest have rendered partly subject and partly tributary to it. The Amu-Derja is its only river; it comes down from the mountains north of India, traverses Bokhara, and skirting Chiva, flows into Lake Aral, where it closes a course of twelve hundred miles, after fertilising the several countries which lie upon its banks. It is the great aliment of the agricultural prosperity of Chiva, the surface of which, like that of its Bokharian neighbour, is intersected by natural or artificial canals, many of which are of considerable breadth (above thirty feet), and constructed with much skill upon solid embankments, with here and there an aqueduct to lead the waters across lower lines of canals which run in contrary directions. The soil produces grain, fruit, and other vegetable crops in superabundance, besides two plants, the Kundjut, whence oil is extracted, and the Djogan, on which the horses are fed. The people graze large herds and flocks of camels, oxen, and sheep, the latter of which attain a great size. Their horses are remarkably strong, performing a distance of eight days' journey at the rate of eighty miles a day, and frequently pass whole days without drinking, and with no food but five or six handfuls of djogan during the four and twenty hours. The principal wild animals are the jackal, wolf, and fox, the eagle, stag, and djeran, which is a species of antelope. There is a chain of mountains in the eastern districts called the "Cheki-Djeri," which extend to the shore of Lake Aral northwards, and is said to contain rich mines of silver, copper, lead, and sulphur; the copper and lead are however the only metals which the Chivans raise. The climate is represented as being temperate and healthy, with little rain or snow, and a short winter.

The number of inhabitants is variously estimated; by some travellers at 350,000, and by others at 500,000; they are of various races, at the head of which stand the "Uzbegs" (or independents), the conquerors of the country, and its despotic rulers, as the Mandshoos are in China. The one, like the other, hold the natives in utter contempt and servitude; indolent and intractable at home, but active and indefatigable where an opportunity is afforded them of indulging their predatory predilections; and proud of their warlike ancestry, from whom they have probably inherited their constant boast—"We live by our arms and our bravery." Their leading characteristic is frankness, and scorn of deceit and lying. The "Sarty," or "Padshiks," who are the aboriginal people of Chiva, chiefly dwell in the towns, and devote themselves especially to the pursuits of trade; they are a cunning, treacherous, and cowardly race of men, and addicted to gambling and drinking, in which their general affluence enables them freely to indulge. The "Kara-Kalpaks," in number about 100,000, form the agricultural portion of the community, and are in great indigence, as well as cruelly oppressed by both Uzbeg and Padshik; they travel about the country in quest of a livelihood, and would prove formidable allies to an invader who would deliver them from their masters' yoke. In addition to the three preceding classes, there are about 30,000 Persian and from 2000 to 3000 Russian captives (6000, according to the Russian accounts), who drag out a miserable existence among the Chivians. The Turkoman tributaries, a roving race, must also be numbered among the Khan's subjects.

There are 75 towns and villages in the country; the former, five in number, consist of Chiva, surrounded by a wall of earth, and defended by a massive round-shaped citadel, but of slate-clay, on the Amu-Derja, with 5000 inhabitants, where the Khan resides; New-Urgendshe, or Orgundsh, to the north of Chiva, with 10,000; both are places of considerable trade. In the south are Chezarist; in the north, near the westernmost mouth of the Amu-Derja, Churat; and on the Caspian Sea, Mangishlank, situated on the peninsula of that name, which is frequented by the Russian merchantmen.

Its last sovereign, Mohammed Rahim Khan, who figures in Russian despatches under the designation of "sovereign highness," and "Mighty Lord of the regions of the East," inherited the sovereignty in 1802; he was a prince of distinguished talent and gigantic stature—another Barbarossa; for his red beard, according to Eastern convictions, not merely entitled him to the name, but was an appendage symbolical among them for prowess and capacity. Chiva was an insignificant state when this man came to rule over it; but wading through all kinds of cruelties, of which the extinction of every relative and rival was not the least, putting an end to the power of the leading Uzbeg families, who had reduced the authority of his predecessors to a mere shadow, and waging successful war, with the aid of his Turkman and Kirgisian allies, against Persia and Bokhara, he raised his dominions to a pitch of ascendancy which they had not enjoyed for centuries before. A vigorous and discreet organization of his internal resources powerfully seconded his ambitious views, which were, however, arrested by the hand of death in the year 1826. Of his successor, Alla Khul Khan, it is enough to say that he inherited his territory with little of the ability by which it had been rendered extensive and formidable.

Alla Khul, the reigning khan, now in his 45th year, is a peaceably disposed and gentle-hearted character, for whom neither hunting, foraging, nor cruelties have any charm; in fact he is very severe towards all plunderers and thieves, and for this reason not only is he unpopular among his Uzbeg and Turkoman lieges, but was disinherited by his father, who endeavoured, but without effect, to secure the succession to his second son, Rahman Khul. The latter, to whom the oligarchs of the country are much attached on account of his warlike and freebooting propensities, retired to Chezarist upon Alla Khul's accession, threw off all subjection to him, collected tribute from the surrounding districts, and is said to have joined the Russian expedition against his brother.

Alla Khul resides in the citadel of Chiva, is attended by a troup of fifteen guards, and wears a bent sabre at his side as his constant companion. His troops are said to amount to 20,000 men, all mounted; the private, on his departure for a campaign, receives 25 ducats (about nine pounds sterling), one-half in bread, and the remainder in money; besides forage and meal while in the field. Their baggage, ammunition, &c. are borne on camels' backs. The officers, or Jusboshi, receive from 40 to 70 ducats each, according to their rank, independently of provisions: and it is his special duty to see the horses kept in good condition. One-half of the spoils of war belong to the khan; and the prospect of enjoying the other half induces numbers of volunteers to join every marauding expedition: a part of them consists in the heads and ears of their enemies, the khan paying them ten ducats for the former and five for the latter. Their arms are swords and lances, and here and there a firelock, to which the Turkomans add a long knife; the leaders wear coats of mail, and the few firelocks seen among them are a distinction peculiar to the Uzbeg nobles, who have them made in the country, and receive their ball and powder from Chiva, where it is manufactured and preserved in chambers of brick. The ordnance of the whole khannate does not exceed fifteen pieces, cast by Russian prisoners, and mounted on carriages also constructed by them, but unfit for almost any service. Cannon balls are also cast in Chiva, but the use of cartridges seems to be unknown. Although the khan possesses a revenue of more than one hundred thousand pounds, which would enable him to increase his forces considerably, his soldiery are totally unfit to contend against the most insignificant regular troops accustomed to European discipline and warfare.

The principal object which the khan has in view in his foreign inroads is the capture of slaves; these hapless beings are condemned to the hardest labours, with the exception of those who are Sunnites, that is, of the same sect of the Mohammedan religion as the Chivans; these more fortunate captives are placed in their ranks. As the natives never submit to any heavy work, whether in their fields or gardens, they force their prisoners to do it; indeed the Chivan is not only indisposed to, but so ignorant of, agriculture or horticulture, that if they had no Kara-Kalpaks, Russians, Persians, or Calmucks amongst them, it seems probable that they would die of sheer starvation. In aggravation of the severity of their toil, the captives are doomed to scanty nourishment; even the khan himself allows his own slaves no more than at the rate of 120 pounds of meal per month, out of which they must wholly feed and clothe themselves. The prisoners on their arrival are conducted to Chiva, where they are sold like beasts in the open bazaar, at the rate of 60 to 70 ducats per head (about twenty-four to twenty-seven pounds sterling) if in the prime of life and health. These slaves manufacture all the articles of clothing, &c. which the natives require; among others, cottons and silks, camlets, felt, and carpets, copperware, &c. The trade with Russia is considerable, and carried on by caravans, which, even in time of war, are allowed to travel unmolested; and next in value is the trade with Bokhara.

The form of government is despotic in its worst sense; for the council, who assist the khan in judicial and some few other matters, are relentless oligarchs, infinitely more tyrannical than the tyrant whose will is here the only law. The punishments inflicted for offences are exceedingly severe; empaling, which the offender often survives for two whole days, is an ordinary penalty, and burying alive, the offender being compelled to dig his own grave, is not of uncommon occurrence.

The female sex in Chiva lead a wretched life; their husbands exercise the most rigid mastery over them, and they have no mercy to expect at their hands if even a semblance of infidelity can be brought home to them. Their fare is of the scantiest, and the daily allowance even to the khan's wives is weighed out to them. His household has each day for its subsistence 120 pounds of wheat meal, eighty of rice, forty of flesh, and twenty of hard butter. So rigid indeed is the system pursued, that the very ladies of the prince are frequently obliged to sell the remains of their meals in the bazaar in order to obtain wherewith to buy silk or other necessaries. The khan's kitchen is besieged twice a day by the people of the household, who bear away the prescribed rations for officers, females, and servants, in earthen vessels. The largest of these rations is laid before the khan himself, and much of it remains unconsumed; but what is left makes a subsequent meal for his ministers and household officers, who may be seen dancing eager attendance for it in the antechamber, where the scramble for their prince's "leavings" occasions scenes savouring little of courtly refinement.

The khaness, Alla Khul's eldest wife, is a Kirghisian princess, and from her consort's quiet pliable character, no less than her own violent temper, exercises uncontrolled sway over him. All her domestics are captives, and kept in good order by a thong, in the use of which she is no mean adept.—*Helmersen's Report; Letters of an Officer on the Expedition*, 1839; *Muravief's Journal*, &c.

Ploughing in Upper California.—From the construction of the plough, there being no mould-board or feathered shear, the furrow cannot be cut up and turned over as with an English plough, a rut only being made; consequently the soil can only be broken by successively crossing and recrossing the field many times; and it is evident that however often crossed by a machine of this kind, the root weeds of any tenacity can never be cut, so that this mode of ploughing must always be very imperfect. The necessity of giving so many crossings is a great waste of labour. It is no uncommon thing to see on the large maize estates in some parts of Mexico upwards of one hundred ploughs at work together. With these ploughs it is not necessary to divide the field into ridges, and they have only to begin at one side of the field and follow one another up and down, as many as can be employed together without interfering in turning round at the end, which they do in succession, like ships tacking in a line of battle, and so proceed down the same side as they came up.—*Forbes's California.*

Steam.—If the wild tribes of Lake Huron were even at this moment to be told that the white man's recipe for conquering the waves of the great lake before them was to take up a very small portion of it and boil it—if, sixty years ago, Dr. Johnson had been (as, exhausted by a hard day's literary labour, he sat ruminating at his fire-side, waiting for his favourite beverage) told that the tiny volume of white smoke he was listlessly gazing at, as it issued from the spout of his block-iron tea-kettle, was a power competent to rebuke the waves and set even the hurricane at defiance—the red children of nature would listen to the intelligence with no greater astonishment than our venerable lexicographer would have received it. . . . . On salt water as well as on fresh—reeking and fuming under the line, as well as freezing in Canada—on crowded rivers, as well as on those whose shores are desolate—on large streams as well as on small ones—in bays, harbours, friths, æstuaries, and channels—on the small lakes of Ireland, Scotland, and Switzerland—on the large ones in America—on the Red Sea—on the Black Sea—on the Mediterranean—on the Baltic—in fair weather, in foul weather—in a calm as well as in a hurricane—with the current, or against it—this power, when tested, has most successfully answered the great purpose for which it was beneficently created; and it is impossible to reflect on the thousands of human beings who at this moment are being transported by it—it is impossible to summon before the imagination the various steamers, large and small, which, in all directions, in spite of wind and weather, are going straight as arrows to their targets, without feeling most deeply that after all there is nothing new in the discovery that "the spirit of God moves upon the face of the waters."—*Quarterly Review.*

Clearing Land in Canada.—The process is begun by cutting with a heavy bush-hook the shrubs and slender saplings, which are then piled in large heaps; the axe follows and cuts down the young trees, the larger ones being left for the present: the felled ones are cut in lengths and piled with the limbs on the brush-heaps. All these have been cut quite close to the ground, so that the stumps may offer no obstruction to the harrow: all being piled, nothing remains but to fell the large trees, which is done at about two feet from the ground, the stumps being permitted to remain till the gradual decomposition of the roots allows of their extraction—a work of years. The trunks of the trees are now chopped into lengths; those which are useful for fencing placed by themselves, to be removed; and the remainder, by the efforts of oxen with chains and men with levers, are piled one upon another, and the tops thrown into heaps as before. In this state everything remains during the summer exposed to the burning sun of July, August, and September, which dries up a good deal of the moisture, and makes the heaps fit to burn. In the fall (autumn), advantage is taken of a dry time to put fire to the logs and brush, which burn rapidly, and are usually consumed, with the exception of some remnants of the log-heaps, which are piled together for a final burning. The running of the fires over the ground kills every vegetable, and the fertilising ashes make the whole in good order for culture. The plough is not put into the ground for some years, until the small stumps and roots have decayed; it is merely harrowed over, the virgin earth being soft and mellow; and grain is sowed with grass-seed. After the first crop, it remains in grass for several years. Such is the ordinary practice, slightly varying according to circumstances.—*Gosse's Canadian Naturalist.*

HORSE ARMOURY IN THE TOWER.—V. Henry VII.

[Henry VII.]

Passing over the short nominal reign of Edward V., we must pause to describe some remarkable additions made in the succeeding reign, that of Richard III., which, although not of long duration, was remarkable for the great change made in the fashion of the armour. This change consisted not only in the greater richness of the suits, but in the shape of the different portions, which were greatly altered, and in the addition of various pieces hitherto unknown.

The most striking peculiarities consist of the enlarged dimensions of the knee and elbow pieces, which, being generally of a fan-like shape, project from the body with a very grotesque effect; and the pauldrons rise on the shoulders so as almost to present the appearance of the later pass-guards. These characteristics are not, however, exhibited in the Tower armoury, as that collection does not possess a suit of the period we are now speaking of; but they may be seen in the effigy of Sir Thomas Peyton in Isleham Church, Cambridgeshire, which affords one of the best authorities for armour of the reign of Richard III. The salade, and the hausse-col, or gorget of steel, were still worn, the former being surmounted by the knight's cap and crest, or, as in the preceding reigns, surrounded by a roll of silk or linen of the wearer's colours, with a feather at the side.

The sword is belted so as to hang almost in front of the wearer, while the dagger is attached to the right hip. Every variety of fantastic shape was adopted for the shields in tournaments, but in battle they were almost constantly of a pentangular form.

The portions of iron covering which the archers and military men of inferior rank had been accustomed to wear, but which had been gradually becoming less common, were at this period almost entirely laid aside; leather jacks, jazerine jackets, and short linen or cloth doublets, the latter most frequently white with St. George's cross upon them, being generally worn by archers, billmen, and guisarmiers. They however retained the salade, or wore in its stead a round iron pot-helmet, or skull-cap.

The outré and somewhat ludicrous appearance presented by the richer suits of armour of this reign was greatly modified in the reign of Henry VII., when it assumed a more simple and more elegant form, retaining however the richness imparted to it by engraving and other ornamental effects, which indeed were even carried to a greater length. Armour *ribbed* and *fluted* in many places was very commonly worn, being besides ornamented by the engravers, the most eminent and skilful of whom were sought for by the princes and noblemen of the age. The armour was principally imported at this time from Germany, and many specimens of the work of the best German artists yet remain to attest the care taken by the wearers to ensure the utmost perfection in the decoration of their iron panoply. Gold and silver were also profusely employed, being inlaid in the steel in pictorial or arabesque designs; and in some cases, where engraving was employed, the interstices, or marks of the graver, were filled up with a black composition called *niello* by the Italians, and much used by the goldsmiths of those times to give effect to such of their productions as had been ornamented by the chaser.

The breastplate in the time of Henry VII. had acquired

a globular form, bulging out from the breast with no very beautiful effect, and was composed of but one piece, as in the time of Edward IV. The helmet fitted close to the head, and was provided with moveable lames or plates at the back, to guard the neck and yet to allow the head to be thrown back with ease, in a manner similar to the casquetels of the reigns of Henry VI. and Edward IV. It opened to receive the head by throwing up the mentonnière, or lower part that guarded the chin and throat, as well as the visor, which turned upon the same screw. Towards the latter end of this reign the *panache*, which had first appeared on the apex of the bascinets of Henry V.'s time, was changed for the *plume*, inserted in a pipe affixed for the purpose to the back of the helmet, just above the neck-plates, and instead of consisting of, at the most, but *three*, was now composed of a profusion of magnificent feathers that streamed down the shoulders almost to the crupper of the horse. The helmet used at tournaments was generally oval-shaped with a salient angle in front, and was surmounted with the orle, or chaplet and crest. An additional protection for the neck was introduced about this time called pass-guards, being plates rising perpendicularly from the shoulders so as to ward off the thrust or blow of a weapon directed to the side of the neck. These are very conspicuous in the armour in the Tower placed on the figure intended to represent Henry VII., and may be seen in the engraving from that figure at the head of the present article.

But the new feature in the armour of this period is the *lamboys* (from the French *lambeaux*), a sort of petticoat of steel, intended to supersede the use of the tassets and tuiles hitherto worn, and made in imitation of the cloth or velvet petticoats much worn by civilians of the time. These at first were but of small dimensions, but as they became popular, they increased in length and width until (as we shall see when we come to the reign of Henry VIII.) they descended to the knees, and were formed into folds similarly to a very wide piece of drapery tied round the waist. The sollerets were formed in imitation of the shoes of the period, which, with the proverbial fickleness of fashion, had become so extremely wide at the toes, that it was considered proper to restrict their dimensions by an act of parliament.

The tabard, or coat of arms, which had once been so important an article in military costume, was now but seldom worn, or only on state occasions; indeed the portions of armour which it would have covered were just those parts which were the most highly ornamented, and consequently the parts which the warriors were the most desirous to present to the public view; and even if the armour was not fluted or engraved or otherwise ornamented, it was considered more noble and warlike to expose the highly polished steel than to hide it by a garment having so little the appearance of anything connected with "high deeds of arms and well-contested fields." Henry VII. is, however, represented on his great seal as habited in it.

The shields were so various in shape and dimensions, that it would be perfectly useless to attempt to designate any particular form as the prevailing character of this article of defence at the time of which we are now speaking. The swords, which were made very long, taper to a point, and have a ridge down the centre on both sides the blade. Of the inferior weapons, the halberd, introduced in the reign of Edward IV., was becoming very popular in the English army, in which companies of halberdiers were formed, and held a distinguished rank among the infantry. But the hand-gun was quickly superseding all other weapons in the hands of the common soldiery, and in this reign it received an impetus from the introduction of the arquebus (corrupted from arc-a-bouche or arc-a-bousa), which differed from the original hand-gun in having a sort of lock attached to the iron tube, with a cock to hold the match; this being in the form of the letter S reversed, was called the serpentine; it turned on a pivot in the centre, and the upper end, which held the match, was brought down to the pan by pulling back the lower end. When Henry VII. established the body of yeomen of the guard in 1485, he armed half of them with bows and arrows, and the other half with arquebusses.

DRUMMOND AND BUDE LIGHTS.—II.

In our last paper on this subject we collected the most important facts concerning the origin and use of the Drummond light. The experiments there detailed were made nearly ten years ago. The intensity of the light is beyond dispute; but we are not aware what other difficulties may have prevented its adoption in our lighthouses. On this subject Lieut. Drummond, in his communication to the Royal Society in 1830, says:—"It now only remains for me to perform the agreeable task of bearing testimony to the liberal spirit evinced by the Trinity Corporation on this occasion, and to the desire which they have manifested of facilitating, by every means in their power, the introduction of this method of illumination into lighthouses. Indeed I hesitate not to express my belief that, if this do not take place, it will arise from some insurmountable difficulties in the way of its practical application, and not from the want of a full and impartial trial on the part of that body, to whom these establishments are entrusted." As the subject of this paper merely relates to the production of the light itself, we shall not offer any remarks on lighthouse arrangements in other respects; but we shall merely observe that the non-employment of the lime light is probably due to the dangerous nature of the mixed gases employed. When mixed, there is danger of an explosion of a very awful kind, which nothing but the most perfect apparatus, and the most careful attention from the persons employed, can avert. Lieut. Drummond devised a very ingenious mode of supplying the lime balls as fast as they were needed; but the supply of the gases is a source of some apprehension.

It may be proper here to describe the nature of a powerful light which has been employed in most of the French lighthouses for some years past, and which differs totally from our English arrangements. A very powerful lamp on the Argand principle is placed in the centre of the upper part of the lighthouse: this lamp was, we believe, suggested by M. Fresnel, and has four concentric wicks, the outer one more than three inches in diameter, with air passing up between the wicks to feed the flame. Around this strong light eight lenses, thirty inches in diameter, are arranged, touching each other at the edges (being square), and forming a hollow octagonal space about the lamp. Above these, smaller lenses of a similar construction are arranged; but so shaped, that by inclining inwards, they all meet towards the centre of the building, leaving only an opening for smoke, &c. to escape. The light yielded by the lamp, therefore, strikes upon glass lenses in sixteen different directions: through eight of these lenses the light is refracted and focalised at a long distance off; while that portion of the light which falls on the oblique over-hanging lenses is afterwards reflected downwards so as to become nearly parallel with the other rays. By the revolving of this apparatus, every lens in turn throws the rays out to sea, while only one single lamp is employed for the whole. Each lens is too large to be made from one piece of glass; it is therefore built up of several concentric zones or rings, and called a polyzonal lens, a form suggested by Sir D. Brewster thirty years ago.

About two years ago, the French journals spoke with great commendation of an intense light which had been recently proposed by M. Gaudin. This light was capable

of being produced with any desired degree of intensity; and its employment was suggested in lighthouses as well as other public places. We are not aware whether any useful application of this light has yet been made; but it appears to have been in its nature a modification more or less remote of the lime light employed in Ireland.

We have now to speak of another mode of illumination, which, from circumstances that have recently occurred, seems as if it would be brought into profitable employment; we mean that light which is called the "Bude," the "Oxy-oil," and the "Gurney Light;" the first name derived, we believe, from the residence of the inventor in Cornwall, the second from the mode of action, and the third from the name of another inventor. The nature of this light is as follows:—In an Argand lamp, as we have before stated, the wick is cylindrical, in order that a current of air should pass up through the centre, and feed the inflammable vapour and volatilised carbon which exists in the middle of the flame; and it is this part of the arrangement that constitutes the peculiar merit of the Argand lamp over the other forms which preceded it. Now the principle of the Bude light consists mainly in passing up a current of *oxygen gas*, instead of one of common air, through the wick of an Argand lamp. The lamp employed is an Argand, with a wick of any required diameter, say one inch. Inside this is carried up a tube, nearly to the top of the wick. This tube is in connexion at the lower end with a gasometer containing oxygen gas, which is easily obtained from an oxide of manganese, plentifully found in many parts of England. When the lamp is trimmed with its wick and a sufficient supply of oil, it is kindled, and the oxygen gas made to pass up through the middle of the flame. In so doing it promotes the rapidity of the combustion, and the result is a large increase in the intensity of the flame. We have witnessed the brilliancy of the flame thus produced at the Polytechnic Institution a few months ago.

Such then is the nature of the Bude or Oxy-oil light, and two circumstances contributed to bring it into notice, viz. 1st, an inquiry into the lighthouse system; and 2nd, the erection of the temporary House of Commons. We have said that the Drummond light produced very favourable results when used at the temporary lighthouse at Purfleet; but as the choice of lights for those buildings rests rather with the Trinity House than with the government, no steps seem to have been taken by the latter, while there were probably some other circumstances which prevented the adoption of the plan by the Trinity House. In 1834, however, a committee of the House of Commons was appointed to inquire into the whole subject of lighthouses, both with respect to the light employed, and to the whole system of management. A great deal of valuable evidence was received on various parts of the subject; and the Committee recommended to the Trinity House that another series of experiments should be made on the "Lime" light. These experiments were placed under the guidance of Mr. Gurney, who had, eleven years before, suggested the possibility of applying the lime light to lighthouse purposes. In the course of the experiments thus prosecuted, it was found that there were certain serious obstacles to the use of the lime light; and these obstacles led to the suggestion of sending up a stream of oxygen gas through the wick of an Argand lamp. A series of experiments were afterwards made, by scientific men engaged for that purpose, on the comparative merits of the Argand lamp, the French or Concentric-wick lamp, and the Bude lamp, without reference to the Drummond light. The results were given in a Report sent to the Trinity House; and the most prominent points in those results were the following:—that a French lamp, by consuming eighteen times as much oil, produced about ten times as much light as a common Argand lamp; and that a Bude lamp will yield nearly twice as much light as a French lamp.

This Report on the availability of the Bude lamp for lighthouses was made in 1838; but there has not yet, as far as we are aware, been any actual application either of the Drummond or Bude lights to lighthouses now in action.

We proceed to the other circumstances connected with the public use of the Bude light. After the burning of the Houses of Parliament a few years ago, there was a temporary building erected for the sittings of the House of Commons, until the permanent building, from the plan of Mr. Barry, is completed. In this temporary building there have been some new methods adopted for warming and ventilating the house, for admitting pure warm air, and expelling impure air. The nature and the success of these contrivances it does not form part of our present subject to consider. It was, however, found that the unconsumed carbon, the carbonic acid, &c., arising from the wax candles burnt during the evening and midnight sittings of the House, greatly interfered with the plan of ventilation adopted by Dr. Reid; and it was determined that an attempt should be made to employ gas instead of wax candles, and that a screen of some kind should entirely separate the flames of gas from the body of the house.

Accordingly towards the conclusion of 1837, the necessary arrangements were made for bringing the gas to the house and arranging the jets in proper order; and on a certain evening in the early part of the following year, after a preliminary trial had been made, the gas-lights were ignited during the evening sitting of the House. The arrangements were as follows:—There were two ceilings to the house, namely, the flat lath and plaster ceiling connected with the roof, and a second ceiling placed a few feet below it. This lower ceiling had been introduced to facilitate the arrangements for hearing and ventilating, and it was now made available for lighting. It was not flat, but was divided into three portions running lengthwise, the central portion being highest and quite horizontal, and the side portions inclining downwards, till they met the walls. The sloping portions were glazed with ground-glass throughout their length, and above the glass were placed three rows of gas-pipes, each pipe perforated with holes about two or three inches apart for the purpose of throwing out several hundred jets of gas. These jets were then lighted, by means of tapers, from end to end of the pipes, and a brilliant illumination spread through the whole house; the light, although intensely strong in itself, being subdued by descending through the ground glass.

This was the nature of the experiment made, and the light produced appeared to be satisfactory; but the expense was very great, it being estimated that the gas would cost 30*l.* per night; whereas the wax candles (about 240 in number) cost 5*l.* per night. From this circumstance chiefly the plan of lighting the house by gas was abandoned.

Nothing farther was decided on until last year, when, in consequence of the experiments which had been made at the Trinity House on the Bude light, it was suggested that this light might possibly be available for the House of Commons. The first point to be determined was the comparative cost of lights of equal intensity, when produced from the Bude lamp, and from wax candles. From some experiments made on this point, it was found that an amount of light which could be produced by the Bude lamp at an expense of 10½*d.* would cost 26 pence when produced from wax candles. The economy of the new method seemed therefore sufficiently obvious. Among the objects which it appeared desirable to attain were these:—that the light should be free from danger; that it should be applicable in the hands of ordinary men; that there should be a sufficient illuminating power; that the expense should not exceed that of wax lights; that the heat resulting therefrom should be entirely insulated from the

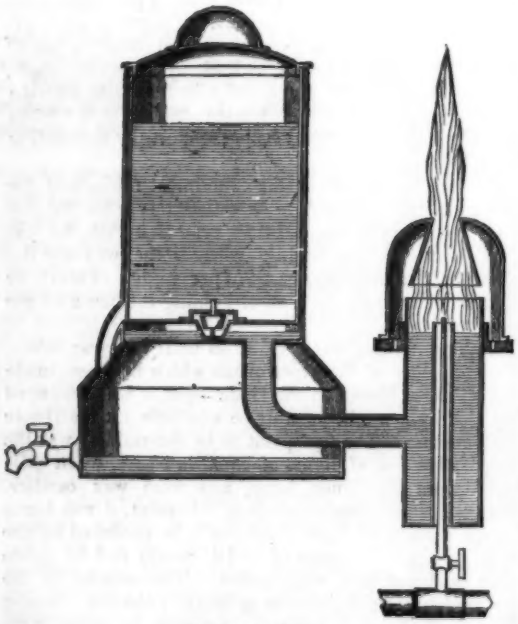
house, so as not to affect the ventilation, &c.; and that the light, instead of being glaring, should meet the eye in a softened and subdued form. On all these points various experiments were made.

It was resolved that during the recess experiments should be made on the best mode of arranging the lights preparatory to the present session. Some of the difficulties have been surmounted, and the house is now under a second course of experiments to ascertain the cheapness of the Bude light. These, it will be remembered, are Argand lamps, supplied with oil in the usual manner, and also with a stream of oxygen gas passing up through the centre of the wick. There are several lamps placed on each side above the sloping glazed skylights.

A few months ago the Bude light was employed to illuminate the face of the clock at the Horse-Guards: the hands and figures are rendered very distinct, and appear as if lighted by strong lunar rays.

There have been several improved forms of lamps lately proposed; but we have only space to allude to one more: this is Beale's light for manufactories. It was proposed as a means of using a very cheap substitute for oil, namely, the refuse tar of a gas-house. This can be purchased at an extremely low rate, and under ordinary circumstances yields only a slight lambent flame, scarcely perceptible. The means of making it available however are these:—The lamp employed is somewhat similar to an Argand, with a hollow circular wick. Up this hollow wick ascends—not air in the same state as for the Argand—not expensive oxygen gas, as in the Bude light—but a current of common air *under pressure*. The lamp is intended for manufactories where steam or other power is employed, by which air can easily be condensed in a small reservoir, and thence conducted through a tube to the lamp. With a pressure of one pound and a half on the square inch, the air rushes up the centre to the wick in such quantity and force as to convert the faint flame into one so intense as to equal, according to Professor Barlow, four and a half Argand lamps.

Fig. 4.



[Beale's Lamp.]

Still more recently a modification of this lamp, called the Air and Vapour Lamp, has been proposed, in which the air is made to mingle with the vapour of the liquid tar before the latter is ignited.

Omnipotence of the Creator.—The same Being that fashioned the insect, whose existence is only discerned by a microscope, and gave that invisible speck a system of ducts and other organs to perform its vital functions, created the enormous mass of the planet thirteen hundred times larger than our earth, and launched it in its course round the sun,—and the comet, wheeling with a velocity that would carry it round our globe in less than two minutes of time, and yet revolving through so prodigious a space that it takes near six centuries to encircle the sun!—*Lord Brougham's Notes to Paley's Natural Theology.*

Aid of Nature in Manufactures.—Does nature nothing for man in manufactures? Are the powers of wind and water, which move our machinery and assist navigation, nothing? The pressure of the atmosphere and the elasticity of steam, which enable us to work the most stupendous machines—are they not the gifts of nature? to say nothing of the effects of the matter of heat in softening and melting metals, of the decomposition of the atmosphere in the process of dyeing and fermentation. There is not a manufacture which can be mentioned, in which nature does not give her assistance to man, and give it, too, generously and gratuitously.—*David Ricardo.*

Kidney-Beans and Scarlet-Runners.—The seeds of the white kidney-bean and scarlet-runner are much used abroad, and a trial of them is much recommended to the British cottager. They should be soaked in water for several hours; some persons put them in over night. Put them into cold water for boiling with some salt in it. They require much boiling when old, but are then best. Check the boiling with a cupful of cold water when they begin to swell; they will then burst like a mealy potato—drain them immediately, and put them by till required to prepare for dinner. The best mode of dressing them is this:—Put a lump of clarified fat or butter into the saucepan; when melted, dredge in about a third part of a table-spoonful of flour; when mixed, add a wine-glassful of water or broth, stir it till it boils, then add the beans (prepared as above), with some chopped parsley, some pepper and salt, and with or without a chopped shalot: cover the vessel, and shake it now and then over the fire, till the beans are quite hot enough, and have had a couple of boils. They may be tossed up with any remains of cold gravy.—*Labourer's Friend Magazine.*

Motives for making Roads in Africa.—The king of Wowow is making new roads and repairing and widening the old ones leading to and from the city. This is the only instance we have yet seen wherein even the slightest attention has been paid by a chief to the state of the public pathway during the whole of the journey from Badàgry to Yàoorie; and the reason urged by the ruler of this place for undertaking the business is somewhat singular, though shrewd and just. 'If,' says he, 'an enemy were to come towards my gates with a hostile intention, and find the roads broken up or overgrown with weeds, would they not say among themselves, "Oh, this king of Wowow is a careless, slothful, cowardly governor; his town contains but few inhabitants, for see, the path is green and untrodden by human feet; let us go and attack it, for it will easily fall into our hands?" But,' he continued, 'should they find it of convenient width, smooth, and free from grass, they would immediately say,—"This road is trodden by the feet of many people; the town must be populous, strong, and flourishing, and its monarch watchful and brave; if we venture to make an assault, we foresee that we shall be overpowered and slain; it is better for us all to turn back while we are yet undiscovered and unharmed, lest some evil fall upon us when it is too late to retreat."' Thus the talkative old king argues with his people, that they may throw off that laziness which is natural to them, and be animated to industry and labour in the common cause.—*Lander's Journal.*

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